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ABSTRACT

As a part of a larger research project intended to aid university planners, 2,027 faculty and staff at a large western university were questioned about their interest in telecommunications services. Of those surveyed, 366 faculty and 466 others--41%--returned the lengthy mail questionnaire, which included questions about computing, videotex, and conventional television programming. Results related to computer adoption and use indicate that 135 respondents owned a personal computer, while 331 others planned to buy one within the next 5 years. The primary use reported for the personal computer was writing, while comparisons of actual uses by owners with intended uses by non-owners suggest that heavily-advertised uses such as financial management or database access are relatively unpopular. The personal computer, therefore, has become a means of communication, despite advertising that neglects this function of the device. Because of its increasing presence in the home and on the university campus, the use of personal computers deserves further study. (Author/LMM)

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PERSONAL COMPUTERS:

THE NEW ACADEMIC MEDIUM

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ABSTRACT

As a part of a larger research project intended to aid university planners, 2027 faculty and staff at a large western university were questioned about their interest in telecommunications services. Three hundred and sixty-six faculty and 466 others returned the lengthy mail questionnaire, which included questions about computing, videotex and conventional television programming.

This presentation focuses on the adoption and use of personal computers (PCs). One hundred and thirty-five of the respondents owned a PC while 331 others planned to buy one within the next five years. Preliminary results indicate that the primary use of the personal computer is for writing. Comparison of actual uses (by owners) with intended uses (by non-owners) suggests that heavily-advertised uses (such as financial management or database access) are relatively unpopular.

The personal computer has become a means of communication, despite advertising that neglects this function of the device. The personal computer is making its presence felt in the home and on the university campus, and deserves further study.

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Popular literature abounds with references to impacts of the personal computer. Toffler's The Third Wave forsees "the intelligent environment," in which the omnipresent microprocessor transforms our homes. Books such as Chris Evan's The Micro Millennium and Joseph Deken's The Electronic Cottage speak of the enhancement (and in some cases replacement of) professional skills by microcomputers. Following upon the theme of Daniel Bell's The Coming of Post-Industrial Society, the latter works suggest a beneficial outcome from the spread of computer technology.

The microcomputer may also be responsible, we are told, for some negative influences on our society. Cawkell (1981), states that the main concerns about the social impacts have been in the areas of employment, privacy and the control of information. A technology assessment by Nilles (1981, 1982) suggests the rise of an "information elite" with social advantage over those unable to afford personal computing devices.

One might question the revolutionary influence attributed to the personal computer. After all, isn't this just another middle-class toy, over-promoted by the media? How much time needs to pass before owners tire of VisiCalc and Space Invaders, and store the thing in a closet along with last year's fashions? Weizenbaum (1981) compares the selling of the personal computer with the marketing of deodorants, a solution created simultaneously with the problem. "What are people to do with this appliance?" Weizenbaum asks.

This study, along with related research (Rogers, Daley and Wu, 1982) suggests that the personal computer (PC) is a serious phenomenon. For

the majority of 135 owners surveyed, the PC is a tool for professional work, as well as a source of entertainment. More importantly, the spread of the PC may prompt changes in the ways that people communicate with one another.

The Study

The findings presented here are based on a larger study of cable communications options for the university community. All faculty and staff living on a large western campus, plus a 50% sample of those living in the surrounding community, were surveyed during the summer of 1982. The survey was intended to provide information for the planning of future university telecommunications services. Respondents were asked about interest in university-originated television programs, information retrieval, transactional and data communication services, as well as present and future uses of media and computers.

The Respondents

A total of 2027 surveys were sent out, and 41% of these were returned. Of the 832 total respondents, 47% were staff, 44% were faculty and 4% were retired from university work.

Almost two-thirds (62%) of those who completed the questionnaire were males. Average age of the total sample was 48, with a modal response of 42 years. The average household size was 2.7 persons, with 40% of the respondents living in two-person households. Sixty-four percent of the respondents had no children, 16% had one child and 15% had two children. Only five percent had more than two children.

COMPUTERS ON CAMPUS

Computers have been common residents of university campuses since ENIAC, the world's first electronic computer, was completed at the University of Pennsylvania in 1947. Steady decreases in the cost of computers have simultaneously increased their numbers on university campuses, where they have been used for administrative record-keeping and accounting, statistical analysis, simulation, and many different research activities.

Large mainframe computers were the only "computers" unil the early 70's and cost upwards of $1 million . Mainframes were used exclusively by large institutions -- government, corporations, universities -- for large-scale data-processing tasks which could not be carried out by other means. The advent of the minicomputer, and later the microcomputer, resulted in greater access to computing and to a rapid diversification of applications.

We asked faculty and staff various questions about their use of university computers in the course of their jobs. About 60% of the respondents indicated that they used a terminal or word processor at work. About a third of all respondents had access to a university terminal that they could take home to use, and twenty-five percent of them regularly used a terminal at home. Those who did were asked to indicate how many hours per day their terminal was in use. Nearly 50% said they used their terminal about one hour per day and 20% used it about two hours per day. Only 4% used it five or more hours per day.

Our data indicate that computers are mainly used in the university to

manage words, rather than numbers. We found that the most common use of computers in the university was for text editing -- preparing memoranda, reports, articles etc. (50% of the sample indicated this). Other applications were each mentioned by less than 10% of the sample: access to a database, programming, data analysis, electronic mail or bulletin boards, and data analysis. Less than 5% reported use of a computer at work for finance, education, business management, computation, consulting and professional work, or data storage.

PERSONAL COMPUTERS

A computer is a device that receives, stores, manipulates and communicates information (Toong and Gupta, 1982). "Personal" computers are designed to be owned and operated by individuals, rather than institutions. PCs are also known as "microcomputers" (because microprocessors are used in their construction) and as "home computers" (in anticipation of a large consumer marketplace).

The first personal computers were sold in 1975. These were aimed at hobbyists with a firm understanding of electronics, and were relatively difficult to operate. The first truly-usable personal computers began to reach the market in 1977. This first generation of machines were based on an 8-bit microprocessor, and PCs with this word size still dominate the market. However, 16-bit machines are becoming more common, and a 32-bit desktop computer has recently been introduced. The 16-bit machines are likely to remain the standard for PCs over the next two or three years.

The diffusion of PCs has been especially dramatic. From a handful of

purchases by hobbyists in 1975, sales of PCs climbed to over 400,000 in 1980. Sales for 1981 topped $1 billion, and the 1982 sales may double that figure. Among the markets for microcomputers are the 83 million U.S. homes with TV sets, 54 million white-collar workers, 26 million professionals, and 4 million small businesses. Some industry analysts predict that 10 million American households will have a PC by 1985. Other sources think that there may be as many as 80 million personal computers in use by the end of the century (Time, 1983, p. 16). According to a telephone survey of 1,019 registered voters, nearly 80% of adult Americans expect home computers to be commonplace in "the near future" (Time, 1983, p. 14).

Who Buys Personal Computers?

Nilles (1982) reports the results of several surveys conducted in 1978 and 1979. As he describes (pp. 137-138), PC owners at that time were far from representative of the American population:

> they tended to be white, male professionals. Three-quarters of the PC owners surveyed had college degrees and 95 percent had at least some college education. More than one-third had graduate training. The average age of the respondents was in the middle thirties.

Conspicuously absent from the ranks of PC owners have been women, minorities, the uneducated, and the elderly. Our sample of PC owners, as well, are typical "early adopters" (Rogers, 1982): educated and affluent.

Among our respondents, 16% (135) reported owning a PC. More than two-thirds of the PC owners reported one or more other users of the PC in their households. On average, each home computer is used by two or three individuals.

The typical owner of a personal computer tended to be male, to have children, and to be a member of the university faculty, rather than the staff. Personal computer owners tended to subscribe to numerous scholarly journals, and to own one or more TV sets and video cassette recorders.

Why Do They Buy Them?

Motivations for buying a PC are varied, but seem to follow a common pattern. The first PC owners seem to have been motivated by the entertainment value of tinkering with computers. Later purchasers were more motivated by economic considerations. Many owners report having used a computer before, and thought that they could make use of them in their professional lives. In some cases tax laws allow PC buyers to write-off part of the cost of the equipment for business or professional use.

Many PC buyers are prompted by a sense of the future: they understand that computers are at least partially responsible for many recent changes in society, and that it could be helpful if they and their children learned more about the computer. This kind of reasoning is particularly strong among middle-class parents of small children.

The computer itself may function as a kind of adult toy. Anthropologist Sherry Turkle (1982), in her search for the social meaning of the computer, has found this to be one of the two most common images of the computer: as a tool, or as a toy. The personal computer may turn out to be the most socially-acceptable outlet for adult creativity and "play."

Finally, we should not overlook the considerable influence of the marketplace. The cynical outlook is summarized by Nilles (1982, p. 138) and Weizenbaum (1981) in this way: the market for personal computers are driven by the technology, rather than actual needs; personal computers represent a solution for which there is no corresponding

problem; it is advertising that creates the need for the personal computer.

And What Do They Use Them For?

In case studies of readers of a computer hobbyist magazine, Halfhill (1982) found that PC usage fell into three general categories: education, entertainment, and efficiency (word processing, spreadsheet packages, programming, etc.). All of the owners surveyed used their PC for all three types of applications, but in widely-varying proportions.

Articles about PC uses typically describe a number of potential uses. For example, Moses (1979) lists these possibilities: recreation, hobbies, education, control of appliances, communication services, electronic libraries, information retrieval and office work. He mentions writing only in an aside: "Word-processing services in the home, such as those for editing papers, do not seem far away." In contrast, our data on PC use in the university faculty and staff homes indicate that word-processing dominates the use of the PC.

We asked PC owners to estimate the number of hours a week their PC is in use for each of a number of functions such as word processing and programming. Table One shows that the most prominent uses were: 1) work-related word processing, 2) entertainment/games, 3) programming, 4) scientific calculation, and 5) personal word processing.

Average reported usage across all respondents for each of the above uses was greater than two hours per week. For each, respondents who reported at least some usage estimated a typical duration of between one and five hours per week. The total number of hours of PC use in each

TABLE 1. USE OF THE HOME COMPUTER IN 143 HOUSEHOLDS

Types Of Use	Percent Reporting At Least Some Use	Mean Hours of Use	Range in Hours Per Week
Work-related W. P.	58	5.9	0-60
Entertainment/Games	47	2.7	0-25
Programming	57	2.6	0-40
Personal Word Processing	54	2.1	0-30
Scientific Calculations	48	1.9	0-20
Business Management	25	0.9	0-50
Child Learning	24	0.9	0-15
Adult Learning	23	0.6	0-8
Database Access	20	0.6	0-12
Home Budgeting	23	0.5	0-20
Other Micro Use	11	0.6	0-20
TOTALS	91	17.6	0-82*

* Total household usage may in some cases reflect the use of more than one micro computer in the home.

household averaged about 18 hours per week.

Considering both types of word-processing together, it is obvious that writing dominates the use of these machines: they are used an average of eight hours per week for this purpose, three times the number of hours devoted to the next most-popular use, entertainment. The primacy of the word processing function held steady even when we broke the sample into subgroups: whether faculty or staff, computing novice or computing expert, they use their PC for writing more than anything else.

A recent study on the diffusion of home computers by Rogers, Daley and Wu (1982) also found writing applications to be salient among potential adopters. Next to the concept of "the convenience of working at home," word processing was the most mentioned reason for purchasing a

PC. This study found the entertainment or "games" application of the PC to be the dominant use in homes. Next to "games," however, the PC was used mostly for various word-processing applications.

In the present study we found that the percentage of time the personal computer was used for word processing (relative to the total usage for all purposes) was related to several owner characteristics. Women reported a higher percentage use in personal word processing applications than men ($r=.25$, $p<.01$), but there was no gender difference for work-related word processing tasks. Faculty members were more likely to report higher percentage of work-related word processing use than non-faculty staff ($r=.30$, $p<.001$).

The relative percent use for personal word processing was also associated with whether or not there were children in the home ($r=.26$, $p<.01$). In homes with children the personal computer was more often used for entertainment and educational purposes and these other uses reduced the relative prominence of word processing. Multiple users in the home usually meant a wide variety of uses.

Another characteristic significantly associated with word processing use was the owner's computing expertise. Respondents experienced in using a computer for progamming or statistical analysis in their work reported a smaller proportion of total use in word processing -- whether personal ($r=.28$, $p<.001$), or work-related ($r=.27$, $p<.01$).

Despite these differences in the relative usage of word processing, the actual amount of use for writing is not associated with user characteristics. Only computer expertise is significantly related to

hours of use for work-related word processing, and this correlation ($r=.20$, $p<.01$) is much lower than than the percentage-of-use correlation reported above. Thus, the computer expert, while using the personal computer for a greater variety of functions, at the same time uses it for word processing almost as much as the less-expert colleague. For all types of users in this academic community, whether faculty or staff, male or female, expert or novice, with children or without, the use of the personal computer for writing has become uniquely important.

Thus, the heaviest users of PCs may not be the number-crunchers and information managers, but the writers and the players. As one social researcher puts it: "I'm sold on a general purpose micro and the word processing software as a fantastic benefit to anyone dealing with text information" (Mason, 1982, p. 13).

FUTURE PC OWNERS

Respondents who did not own a PC were asked about their likelihood of purchasing one. They were also asked about their anticipated uses of the computer. Further, they were questioned about their willingness to invest in a keyboard terminal which would allow them to access computer services on a cable network.

Fifty percent said they expected to purchase a PC in the forseeable future. Of these, more than 60% -- one quarter of all respondents -- expected to buy one within the next two years. Most expect to pay between $1,000 and $3,000 for their PC, but as many as 20% plan to spend over $4,000. Table Two shows that these respondents expect to use their personal computer primarily for word-processing, personal finances, and research.

Prospective owners anticipate much more use of the PC for personal finances than might be expected from the habits of current owners. Forty-one percent of perspective owners expect "budgeting and accounting" to be a primary use, while only 23 percent of current owners report any use for this purpose. Also, while entertainment is anticipated as a main use by only 7 percent, it is the second most prominent use among current owners. Rogers, Daley and Wu (1982) also found that, while entertainment uses had low salience prior to purchase, it became a primary use after purchase.

These descrepancies between anticipated and actual use of the PC may be due to a misleading image of PC capabilities in the mind of the user. For while the PC can be used for many purposes, in certain applications

TABLE 2. PROJECTED USES OF THE MICROCOMPUTER IN THE HOME.*

Type of Use	Count	Percent of Responses	Percent of Cases
Word Processing	172	29.0	53.1
Budgeting & Accounting	135	22.8	41.7
Research	43	7.3	13.3
Entertainment	39	6.6	12.0
Work	34	5.7	10.5
Computation	25	4.2	7.7
Programming	24	4.0	7.4
Education	21	3.5	6.5
Learning	19	3.2	5.9
Business	16	2.7	4.9
Database	15	2.5	4.6
Mail	9	1.5	2.8
Data Storage	8	1.3	2.5
Other	33	5.6	10.2
TOTAL	593	100.0	183.0

* 324 respondents gave these projections regarding the primary uses they would have for a PC.

it has a considerable advantage over the traditional alternatives. A text-editor, which makes revisions so much easier, has clear advantages over even the best electric typewriter.

More than one-quarter of the faculty have already purchased PCs, a startling figure given the newness and expense of the equipment. [Since this survey a group of 130 humanities professors, and dozens of individual university faculty, have acquired personal computers for their work.] In contrast, less than five percent of all U.S. households are estimated to own PCs at present.

If we consider the anticipated purchases of personal cmputers, we would expect most (60%) of the faculty to own a PC within the next five

years. Including the purchase of "keyboard devices" that could be hooked up to a television set pushes the percentage of faculty computer owners up to 67%.

The latter statement refers to an alternative to a fully-configured PC: a keyboard terminal unit used in conjunction with the TV set and linked to computers on a cable network. Thirty-three percent of respondents showed interest in such a device. Most of those interested indicated willingness to pay between $200 and $500 for the terminal.

Videotex services, aptly enough, were the crossroads for respondent interest in both TV and computers. It is not surprising that interest in videotex should be highly correlated (.43, $p<.001$) with desire for the basic cable service that makes it possible. But videotex interest was also associated with plans to buy a personal computer (.35, $p<.001$) and with amount of use (.21, $p<.001$). Ownership of television equipment was positively associated with interest in videotex: ownership of a video cassette recorder (.27, $p<.001$), and number of TV sets owned (.16, $p<.001$). In general, videotex was desireable to younger (.27, $p<.001$) audience, who tended to have children (.15, $p<.001$) and to be dissatisfied with current television programming (.19, $p<.001$).

This university plans to construct a broad-band communications network for a variety of services, including instructional television, voice communication and data communication. We asked our respondents a series of questions about potential future services, which we will not review here in their entirety. Suffice to say that the two most popular services were text editing and transmitting to a remote high quality printer, (a service that would enable the user to produce publication-

quality manuscripts).

Respondents were also asked: "If you had a PC or terminal that could be linked to your office computer system, approximately what proportion of your work would you be likely to do at home?" On average, respondents expected to do about 20% of their work at home.

DISCUSSION

A survey of one hundred and thirty-five academic owners of personal computers has revealed that word-processing is by far the dominant use for these machines. Among future owners of PCs word-processing also was the dominant projected use.

The results suggest at least two conclusions. The first is that the PC is being used for a purpose not fully forseen either by its promoters or its detractors: that of a writing instrument. We think that this moves the PC out of the realm of the toy, and into the realm of the tool. It deserves study as a communication medium.

The second conclusion is that potential consumers are confused about just what PCs are good for. Perhaps consumers make inferences from what they know are major uses for larger computers, such as accounting. Or they may have been exposed to business people who actually do use accounting programs.

And, of course, there is the influence of the media. Advertisements for the PC typically feature accounting applications, such as the VisiCalc spread-sheet program, video games, or educational software. These applications often make use of attractive screen graphics, and

thus make nice pictures. These sorts of applications (and VisiCalc, in particular) have also received a lot of media exposure because of the great sums of money they have earned their creators.

Whatever the reasons, the reality of PC ownership differs from the expectations of their buyers. The future owners we surveyed, while expecting to use the PC primarily for text-editing, also expected to use it almost as much for accounting or budgeting. If they are anything like current users, however, they will use such applications little or not at all.

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